

## SEQUENCE LISTING

<110> Ting, Alice Y  
 <120> METHODS AND COMPOSITIONS FOR PEPTIDE AND PROTEIN LABELING  
 <130> M0656.70088US01  
 <140> not yet assigned  
 <141> 2004-01-09  
 <150> US 60/438,939  
 <151> 2003-01-09  
 <160> 21  
 <170> PatentIn version 3.2  
 <210> 1  
 <211> 321  
 <212> PRT  
 <213> Escherichia coli Bir A  
 <400> 1

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|
| Met | Lys | Asp | Asn | Thr | Val | Pro | Leu | Lys | Leu | Ile | Ala | Leu | Leu | Ala | Asn | 1   |     | 5   |     | 10 |     |     |     | 15  |
| Gly | Glu | Phe | His | Ser | Gly | Glu | Gln | Leu | Gly | Glu | Thr | Leu | Gly | Met | Ser |     | 20  |     | 25  |    |     |     | 30  |     |
| Arg | Ala | Ala | Ile | Asn | Lys | His | Ile | Gln | Thr | Leu | Arg | Asp | Trp | Gly | Val |     | 35  |     | 40  |    |     | 45  |     |     |
| Asp | Val | Phe | Thr | Val | Pro | Gly | Lys | Gly | Tyr | Ser | Leu | Pro | Glu | Pro | Ile | 50  |     | 55  |     |    | 60  |     |     |     |
| Gln | Leu | Leu | Asn | Ala | Lys | Gln | Ile | Leu | Gly | Gln | Leu | Asp | Gly | Gly | Ser | 65  |     | 70  |     |    | 75  |     |     | 80  |
| Val | Ala | Val | Leu | Pro | Val | Ile | Asp | Ser | Thr | Asn | Gln | Tyr | Leu | Leu | Asp |     | 85  |     | 90  |    |     |     | 95  |     |
| Arg | Ile | Gly | Glu | Leu | Lys | Ser | Gly | Asp | Ala | Cys | Ile | Ala | Glu | Tyr | Gln |     | 100 |     | 105 |    |     |     | 110 |     |
| Gln | Ala | Gly | Arg | Gly | Arg | Arg | Gly | Arg | Lys | Trp | Phe | Ser | Pro | Phe | Gly |     | 115 |     | 120 |    |     | 125 |     |     |
| Ala | Asn | Leu | Tyr | Leu | Ser | Met | Phe | Trp | Arg | Leu | Glu | Gln | Gly | Pro | Ala | 130 |     | 135 |     |    | 140 |     |     |     |
| Ala | Ala | Ile | Gly | Leu | Ser | Leu | Val | Ile | Gly | Ile | Val | Met | Ala | Glu | Val | 145 |     | 150 |     |    | 155 |     |     | 160 |
| Leu | Arg | Lys | Leu | Gly | Ala | Asp | Lys | Val | Arg | Val | Lys | Trp | Pro | Asn | Asp |     | 165 |     | 170 |    |     |     | 175 |     |
| Leu | Tyr | Leu | Gln | Asp | Arg | Lys | Leu | Ala | Gly | Ile | Leu | Val | Glu | Leu | Thr |     | 180 |     | 185 |    |     |     | 190 |     |

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
 195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
 210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
 225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
 245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
 260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
 275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
 290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
 305 310 315 320

Lys

<210> 2  
 <211> 966  
 <212> DNA  
 <213> Escherichia coli Bir A

<400> 2

|  |     |
|--|-----|
| atgaaggata acaccgtgcc actgaaattg attgccctgt tagcgaacgg tgaatttcac  | 60  |
| tctggcgagc agttgggtga aacgctggga atgagccggg cggctattaa taaacacatt  | 120 |
| cagacactgc gtgactgggg cgttgatgtc tttaccgttc cgggtaaagg atacagcctg  | 180 |
| cctgagccta tccagttact taatgctaaa cagatattgg gtcagctgga tggcggtagt  | 240 |
| gtagccgtgc tgccagtgat tgactccacg aatcagtacc ttcttgatcg tatcggagag  | 300 |
| cttaaatecg gcgatgcttg cattgcagaa taccagcagg ctggccgtgg tcgccggggg  | 360 |
| cggaaatggg tttcgctttt tggcgcaaac ttatatattgt cgatgttctg gcgtctggaa | 420 |
| caaggcccgg cggcggcgat tggtttaagt ctggttatcg gtatcgtgat ggcggaagta  | 480 |
| ttacgcaagc tgggtgcaga taaagttcgt gttaaattggc ctaatgacct ctatctgcag | 540 |
| gatcgcaagc tggcaggcat tctggtggag ctgactggca aaactggcga tgcggcgcaa  | 600 |
| atagtcattg gagccgggat caacatggca atgcgccgtg ttgaagagag tgtcggtta   | 660 |
| caggggtgga tcacgctgca ggaagcgggg atcaatctcg atcgtaatac gttggcggcc  | 720 |
| atgctaatac gtgaattacg tgctgcgttg gaactcttcg aacaagaagg attggcacct  | 780 |
| tatctgtcgc gctgggaaaa gctggataat tttattaatc gccagtgaa acttatcatt   | 840 |

ggtgataaag aaatatttgg catttcacgc ggaatagaca aacaggggggc tttattactt 900  
gagcaggatg gaataataaa accctggatg ggcggtgaaa tatccctgcg tagtgcagaa 960  
aaataa 966

<210> 3  
<211> 13  
<212> PRT  
<213> Escherichia coli

<220>  
<221> MISC\_FEATURE  
<222> (2)..(2)  
<223> Xaa is any amino acid

<220>  
<221> MISC\_FEATURE  
<222> (3)..(3)  
<223> Xaa is Asp, Glu, Asn, Gln, Ser, Thr, Gly, Ala, Pro, Met or Cys

<220>  
<221> MISC\_FEATURE  
<222> (5)..(5)  
<223> Xaa is Phe or Leu

<220>  
<221> MISC\_FEATURE  
<222> (6)..(6)  
<223> Xaa is Glu or Asp

<220>  
<221> MISC\_FEATURE  
<222> (7)..(7)  
<223> Xaa is Ala, Gly, Ser, or Thr

<220>  
<221> MISC\_FEATURE  
<222> (8)..(8)  
<223> Xaa is Gln, or Met

<220>  
<221> MISC\_FEATURE  
<222> (10)..(10)  
<223> Xaa is Ile, Met, or Val

<220>  
<221> MISC\_FEATURE  
<222> (11)..(11)  
<223> Xaa is Glu, Leu, Val, Tyr, or Ile

<220>  
<221> MISC\_FEATURE  
<222> (12)..(12)  
<223> Xaa is Trp, Tyr, Val, Phe, Leu, or Ile

<220>  
<221> MISC\_FEATURE  
<222> (13)..(13)  
<223> Xaa is Asn, Gln, Ser, Thr, Tyr, Gly, Ala, Val, Leu, Ile, Pro, Phe, Met, Trp, or Cys

<400> 3

Leu Xaa Xaa Ile Xaa Xaa Xaa Xaa Lys Xaa Xaa Xaa Xaa  
1 5 10

<210> 4

<211> 13

<212> PRT

<213> Artificial sequence

<220>

<223> Oligonucleotide

<400> 4

Leu Asn Asp Ile Phe Glu Ala Gln Lys Ile Glu Trp His  
1 5 10

<210> 5

<211> 15

<212> PRT

<213> Artificial sequence

<220>

<223> Oligonucleotide

<400> 5

Gly Leu Asn Asp Ile Phe Glu Ala Gln Lys Ile Glu Trp His Glu  
1 5 10 15

<210> 6

<211> 321

<212> PRT

<213> Escherichia coli

<400> 6

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Gly Asn Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 7  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 7

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Gly Ser Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 8  
<211> 321  
<212> PRT  
<213> Escherichia coli

<220>  
<221> MISC\_FEATURE

<222> (83)..(83)  
<223> Xaa is Val, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (89)..(89)  
<223> Xaa is Ser, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (90)..(90)  
<223> Xaa is Thr, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (91)..(91)  
<223> Xaa is Asn, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (92)..(92)  
<223> Xaa is Gln, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (107)..(107)  
<223> Xaa is Cys, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (112)..(112)  
<223> Xaa is Gln, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (115)..(115)  
<223> Xaa is Gly, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (116)..(116)  
<223> Xaa is Arg, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (117)..(117)  
<223> Xaa is Gly, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (118)..(118)  
<223> Xaa is Arg, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (123)..(123)  
<223> Xaa is Trp, or any other amino acid

<220>  
<221> MISC\_FEATURE  
<222> (132)..(132)  
<223> Xaa is Tyr, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (134)..(134)  
 <223> Xaa is Ser, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (142)..(142)  
 <223> Xaa is Gly, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (186)..(186)  
 <223> Xaa is Gly, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (188)..(188)  
 <223> Xaa is Leu, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (189)..(189)  
 <223> Xaa is Val, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (190)..(190)  
 <223> Xaa is Glu, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (204)..(204)  
 <223> Xaa is Gly, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (206)..(206)  
 <223> Xaa is Gly, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (207)..(207)  
 <223> Xaa is Ile, or any other amino acid

<220>  
 <221> MISC\_FEATURE  
 <222> (235)..(235)  
 <223> Xaa is Arg, or any other amino acid

<400> 8

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
 1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
 20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
 35 40 45



Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Xaa Leu Pro Val Ile Asp Xaa Xaa Xaa Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Xaa Ile Ala Glu Tyr Xaa  
100 105 110

Gln Ala Xaa Xaa Xaa Xaa Arg Gly Arg Lys Xaa Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Xaa Leu Xaa Met Phe Trp Arg Leu Glu Gln Xaa Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Xaa Ile Xaa Xaa Xaa Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Xaa Ala Xaa Xaa Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Xaa Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 9  
<211> 321  
<212> PRT  
<213> Escherichia coli

<220>  
<221> MISC\_FEATURE

<222> (90)..(90)

<223> Xaa is Gly, Ala, or Val

<400> 9

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Lys | Asp | Asn | Thr | Val | Pro | Leu | Lys | Leu | Ile | Ala | Leu | Leu | Ala | Asn |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |
| Gly | Glu | Phe | His | Ser | Gly | Glu | Gln | Leu | Gly | Glu | Thr | Leu | Gly | Met | Ser |  |
|     |     |     | 20  |     |     |     | 25  |     |     |     |     |     | 30  |     |     |  |
| Arg | Ala | Ala | Ile | Asn | Lys | His | Ile | Gln | Thr | Leu | Arg | Asp | Trp | Gly | Val |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |
| Asp | Val | Phe | Thr | Val | Pro | Gly | Lys | Gly | Tyr | Ser | Leu | Pro | Glu | Pro | Ile |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| Gln | Leu | Leu | Asn | Ala | Lys | Gln | Ile | Leu | Gly | Gln | Leu | Asp | Gly | Gly | Ser |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Val | Ala | Val | Leu | Pro | Val | Ile | Asp | Ser | Xaa | Asn | Gln | Tyr | Leu | Leu | Asp |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |
| Arg | Ile | Gly | Glu | Leu | Lys | Ser | Gly | Asp | Ala | Cys | Ile | Ala | Glu | Tyr | Gln |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Gln | Ala | Gly | Arg | Gly | Arg | Arg | Gly | Arg | Lys | Trp | Phe | Ser | Pro | Phe | Gly |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Ala | Asn | Leu | Tyr | Leu | Ser | Met | Phe | Trp | Arg | Leu | Glu | Gln | Gly | Pro | Ala |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Ala | Ala | Ile | Gly | Leu | Ser | Leu | Val | Ile | Gly | Ile | Val | Met | Ala | Glu | Val |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |
| Leu | Arg | Lys | Leu | Gly | Ala | Asp | Lys | Val | Arg | Val | Lys | Trp | Pro | Asn | Asp |  |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Leu | Tyr | Leu | Gln | Asp | Arg | Lys | Leu | Ala | Gly | Ile | Leu | Val | Glu | Leu | Thr |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Gly | Lys | Thr | Gly | Asp | Ala | Ala | Gln | Ile | Val | Ile | Gly | Ala | Gly | Ile | Asn |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Met | Ala | Met | Arg | Arg | Val | Glu | Glu | Ser | Val | Val | Asn | Gln | Gly | Trp | Ile |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Thr | Leu | Gln | Glu | Ala | Gly | Ile | Asn | Leu | Asp | Arg | Asn | Thr | Leu | Ala | Ala |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Met | Leu | Ile | Arg | Glu | Leu | Arg | Ala | Ala | Leu | Glu | Leu | Phe | Glu | Gln | Glu |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Gly | Leu | Ala | Pro | Tyr | Leu | Ser | Arg | Trp | Glu | Lys | Leu | Asp | Asn | Phe | Ile |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |
| Asn | Arg | Pro | Val | Lys | Leu | Ile | Ile | Gly | Asp | Lys | Glu | Ile | Phe | Gly | Ile |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |
| Ser | Arg | Gly | Ile | Asp | Lys | Gln | Gly | Ala | Leu | Leu | Leu | Glu | Gln | Asp | Gly |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 10  
<211> 321  
<212> PRT  
<213> Escherichia coli

<220>  
<221> MISC\_FEATURE  
<222> (90)..(90)  
<223> Xaa is Gly, Ala, or Val

<220>  
<221> MISC\_FEATURE  
<222> (91)..(91)  
<223> Xaa is Ser, Gly, Ala, or Leu

<400> 10

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Xaa Xaa Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
 210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
 225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
 245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
 260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
 275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
 290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
 305 310 315 320

Lys

<210> 11  
 <211> 321  
 <212> PRT  
 <213> Escherichia coli

<400> 11

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
 1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
 20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
 35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
 50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
 65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Gly Gly Gln Tyr Leu Leu Asp  
 85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
 100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
 115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
 130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
 145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 12  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 12

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Ala Ala Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 13  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 13

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Ala Leu Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 14  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 14

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

[illegible]



<210> 15  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 15

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Lys | Asp | Asn | Thr | Val | Pro | Leu | Lys | Leu | Ile | Ala | Leu | Leu | Ala | Asn |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     |     | 15  |  |
| Gly | Glu | Phe | His | Ser | Gly | Glu | Gln | Leu | Gly | Glu | Thr | Leu | Gly | Met | Ser |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Arg | Ala | Ala | Ile | Asn | Lys | His | Ile | Gln | Thr | Leu | Arg | Asp | Trp | Gly | Val |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |
| Asp | Val | Phe | Thr | Val | Pro | Gly | Lys | Gly | Tyr | Ser | Leu | Pro | Glu | Pro | Ile |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| Gln | Leu | Leu | Asn | Ala | Lys | Gln | Ile | Leu | Gly | Gln | Leu | Asp | Gly | Gly | Ser |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Val | Ala | Val | Leu | Pro | Val | Ile | Asp | Ser | Thr | Asn | Gln | Tyr | Leu | Leu | Asp |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |  |
| Arg | Ile | Gly | Glu | Leu | Lys | Ser | Gly | Asp | Ala | Cys | Ile | Ala | Glu | Tyr | Met |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     |     | 110 |     |  |
| Gln | Ala | Gly | Arg | Gly | Arg | Arg | Gly | Arg | Lys | Trp | Phe | Ser | Pro | Phe | Gly |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Ala | Asn | Leu | Tyr | Leu | Ser | Met | Phe | Trp | Arg | Leu | Glu | Gln | Gly | Pro | Ala |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Ala | Ala | Ile | Gly | Leu | Ser | Leu | Val | Ile | Gly | Ile | Val | Met | Ala | Glu | Val |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |
| Leu | Arg | Lys | Leu | Gly | Ala | Asp | Lys | Val | Arg | Val | Lys | Trp | Pro | Asn | Asp |  |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Leu | Tyr | Leu | Gln | Asp | Arg | Lys | Leu | Ala | Gly | Ile | Leu | Val | Glu | Leu | Thr |  |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Gly | Lys | Thr | Gly | Asp | Ala | Ala | Gln | Ile | Val | Ile | Gly | Ala | Gly | Ile | Asn |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Met | Ala | Met | Arg | Arg | Val | Glu | Glu | Ser | Val | Val | Asn | Gln | Gly | Trp | Ile |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Thr | Leu | Gln | Glu | Ala | Gly | Ile | Asn | Leu | Asp | Arg | Asn | Thr | Leu | Ala | Ala |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Met | Leu | Ile | Arg | Glu | Leu | Arg | Ala | Ala | Leu | Glu | Leu | Phe | Glu | Gln | Glu |  |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Gly | Leu | Ala | Pro | Tyr | Leu | Ser | Arg | Trp | Glu | Lys | Leu | Asp | Asn | Phe | Ile |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |
| Asn | Arg | Pro | Val | Lys | Leu | Ile | Ile | Gly | Asp | Lys | Glu | Ile | Phe | Gly | Ile |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 16

<211> 321

<212> PRT

<213> Escherichia coli

<400> 16

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Thr Asn Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Ala Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 17  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 17

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Thr Asn Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Gly Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
 195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
 210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
 225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
 245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
 260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
 275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
 290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
 305 310 315 320

Lys

<210> 18  
 <211> 321  
 <212> PRT  
 <213> Escherichia coli  
 <400> 18

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
 1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
 20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
 35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
 50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
 65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Thr Asn Gln Tyr Leu Leu Asp  
 85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
 100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
 115 120 125

Ala Asn Leu Ala Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
 130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 19  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 19

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Thr Asn Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Gly Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Val Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 20  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 20

Met Lys Asp Asn Thr Val Pro Leu Lys Leu Ile Ala Leu Leu Ala Asn  
1 5 10 15

Gly Glu Phe His Ser Gly Glu Gln Leu Gly Glu Thr Leu Gly Met Ser  
20 25 30

Arg Ala Ala Ile Asn Lys His Ile Gln Thr Leu Arg Asp Trp Gly Val  
35 40 45

Asp Val Phe Thr Val Pro Gly Lys Gly Tyr Ser Leu Pro Glu Pro Ile  
50 55 60

Gln Leu Leu Asn Ala Lys Gln Ile Leu Gly Gln Leu Asp Gly Gly Ser  
65 70 75 80

Val Ala Val Leu Pro Val Ile Asp Ser Thr Asn Gln Tyr Leu Leu Asp  
85 90 95

Arg Ile Gly Glu Leu Lys Ser Gly Asp Ala Cys Ile Ala Glu Tyr Gln  
100 105 110

Gln Ala Gly Arg Gly Arg Arg Gly Arg Lys Trp Phe Ser Pro Phe Gly  
115 120 125

Ala Asn Leu Tyr Leu Ser Met Phe Trp Arg Leu Glu Gln Gly Pro Ala  
130 135 140

Ala Ala Ile Gly Leu Ser Leu Val Ile Gly Ile Val Met Ala Glu Val  
145 150 155 160

Leu Arg Lys Leu Gly Ala Asp Lys Val Arg Val Lys Trp Pro Asn Asp  
165 170 175

Leu Tyr Leu Gln Asp Arg Lys Leu Ala Gly Ile Leu Gly Glu Leu Thr  
180 185 190

Gly Lys Thr Gly Asp Ala Ala Gln Ile Val Ile Gly Ala Gly Ile Asn  
195 200 205

Met Ala Met Arg Arg Val Glu Glu Ser Val Val Asn Gln Gly Trp Ile  
210 215 220

Thr Leu Gln Glu Ala Gly Ile Asn Leu Asp Arg Asn Thr Leu Ala Ala  
225 230 235 240

Met Leu Ile Arg Glu Leu Arg Ala Ala Leu Glu Leu Phe Glu Gln Glu  
245 250 255

Gly Leu Ala Pro Tyr Leu Ser Arg Trp Glu Lys Leu Asp Asn Phe Ile  
260 265 270

Asn Arg Pro Val Lys Leu Ile Ile Gly Asp Lys Glu Ile Phe Gly Ile  
275 280 285

Ser Arg Gly Ile Asp Lys Gln Gly Ala Leu Leu Leu Glu Gln Asp Gly  
290 295 300

Ile Ile Lys Pro Trp Met Gly Gly Glu Ile Ser Leu Arg Ser Ala Glu  
305 310 315 320

Lys

<210> 21  
<211> 321  
<212> PRT  
<213> Escherichia coli

<400> 21

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Lys | Asp | Asn | Thr | Val | Pro | Leu | Lys | Leu | Ile | Ala | Leu | Leu | Ala | Asn |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |
| Gly | Glu | Phe | His | Ser | Gly | Glu | Gln | Leu | Gly | Glu | Thr | Leu | Gly | Met | Ser |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Arg | Ala | Ala | Ile | Asn | Lys | His | Ile | Gln | Thr | Leu | Arg | Asp | Trp | Gly | Val |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |
| Asp | Val | Phe | Thr | Val | Pro | Gly | Lys | Gly | Tyr | Ser | Leu | Pro | Glu | Pro | Ile |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| Gln | Leu | Leu | Asn | Ala | Lys | Gln | Ile | Leu | Gly | Gln | Leu | Asp | Gly | Gly | Ser |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Val | Ala | Val | Leu | Pro | Val | Ile | Asp | Ser | Thr | Asn | Gln | Tyr | Leu | Leu | Asp |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |
| Arg | Ile | Gly | Glu | Leu | Lys | Ser | Gly | Asp | Ala | Cys | Ile | Ala | Glu | Tyr | Gln |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Gln | Ala | Gly | Arg | Gly | Arg | Arg | Gly | Arg | Lys | Trp | Phe | Ser | Pro | Phe | Gly |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Ala | Asn | Leu | Tyr | Leu | Ser | Met | Phe | Trp | Arg | Leu | Glu | Gln | Gly | Pro | Ala |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Ala | Ala | Ile | Gly | Leu | Ser | Leu | Val | Ile | Gly | Ile | Val | Met | Ala | Glu | Val |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |
| Leu | Arg | Lys | Leu | Gly | Ala | Asp | Lys | Val | Arg | Val | Lys | Trp | Pro | Asn | Asp |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Leu | Tyr | Leu | Gln | Asp | Arg | Lys | Leu | Ala | Gly | Ile | Leu | Val | Glu | Leu | Thr |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Gly | Lys | Thr | Gly | Asp | Ala | Ala | Gln | Ile | Val | Ile | Gly | Ala | Gly | Ser | Asn |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Met | Ala | Met | Arg | Arg | Val | Glu | Glu | Ser | Val | Val | Asn | Gln | Gly | Trp | Ile |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Thr | Leu | Gln | Glu | Ala | Gly | Ile | Asn | Leu | Asp | Arg | Asn | Thr | Leu | Ala | Ala |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Met | Leu | Ile | Arg | Glu | Leu | Arg | Ala | Ala | Leu | Glu | Leu | Phe | Glu | Gln | Glu |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Gly | Leu | Ala | Pro | Tyr | Leu | Ser | Arg | Trp | Glu | Lys | Leu | Asp | Asn | Phe | Ile |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |
| Asn | Arg | Pro | Val | Lys | Leu | Ile | Ile | Gly | Asp | Lys | Glu | Ile | Phe | Gly | Ile |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |
| Ser | Arg | Gly | Ile | Asp | Lys | Gln | Gly | Ala | Leu | Leu | Leu | Glu | Gln | Asp | Gly |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |
| Ile | Ile | Lys | Pro | Trp | Met | Gly | Gly | Glu | Ile | Ser | Leu | Arg | Ser | Ala | Glu |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |  |



Lys